

REMARKS

Amendments

With this amendment, claims 52, 53, 56-58, and 62-80 remain pending.

The subject matter of claim 54 has been incorporated into independent claim 52.

Claims 54 and 55 have, accordingly, been cancelled. Claim 79 has been amended to correct an inadvertent error in the unit of viscosity.

Claims 62 and 72 have been amended according to the description in the paragraphs beginning on line 19 of page 7, line 4 of page 8, and line 11 of page 15, among other passages. The preamble of claim 78 has been modified according to page 5, lines 16-18. Claim 78 was also amended to make explicit that the crystallization is present in the prepreg, the crystals forming on cooling.

Rejection Under 35 U.S.C. § 102(b) Over Clarke et al.

Claims 52, 53, and 55-58 were rejected as anticipated by Clarke et al., U.S. Patent 4,690,836. Applicant respectfully traverses the rejection as it applies to the amended claims and requests reconsideration of the claims.

Each of claims 52, 53, and 55-58 now incorporates the subject matter of former claim 54, which (as the Examiner has correctly recognized) is patentable over this reference. Accordingly, Applicant respectfully requests that the rejection be withdrawn and that the claims be reconsidered.

Rejection Under 35 U.S.C. § 102(b) Over Cochran et al.

Claims 52, 54, 56, and 57 were rejected as anticipated by Cochran et al., U.S. Patent 5,236,646. Applicant respectfully traverses the rejection and requests reconsideration of the claims.

The Cochran patent describes a method in which prepreg plies are consolidated under vacuum and at high temperature to make a laminate without voids. Abstract The Cochran patent does not teach or describe any method for forming the prepgs themselves. Further there is no description of the prepgs vis-à-vis their void content. Column 3, lines 38-42 refer to removing trapped air and volatiles from the prepreg plies, and column 1, lines 61-68 teaches that voids are due to air and volatiles “entrapped within and between the plies before consolidation” and the volatiles may be “because of moisture in the prepreg or volatile material in the resin.” *Id.*, emphasis added. Thus, the Cochran patent does not contemplate fully wet out, void-free prepgs, but leaves the problem of getting rid of voids and volatiles until the consolidation step. The consolidation is described at length in the Cochran patent.

The present application teaches on page 1, in the paragraph beginning on line 23, that fiber-reinforced plastic articles are manufactured by first impregnating the reinforcement with resin to make a prepreg and then consolidating prepgs to make a laminate. In the prior art, the consolidation step was used to remove voids. As Cochran teaches, consolidation was also used to remove volatiles. In contrast, the prepg of the present invention has no voids or substantially no voids. Therefore, the inventive prepg can be consolidated much more quickly and easily since the prepgs already have no voids and volatiles that must be removed and so need only be fused. Page 4, lines 16-23; paragraph beginning on page 15, line 34.

The Cochran teaching do not concern preparing prepregs, but instead concern how to get rid of the voids and volatiles of prepregs during the later consolidation step. The Cochran patent, therefore, does not teach, disclose, or suggest the prepeg material of the present claims that have substantially no voids.

Accordingly, Applicant respectfully requests that the rejection be withdrawn and that the claims be reconsidered.

Rejection Under 35 U.S.C. § 102(b) Over Nose et al.

Claims 72, 74, and 78-80 were rejected as anticipated by Nose et al., EP 0 393 536 A2. Applicant respectfully traverses the rejection and requests reconsideration of the claims.

The present claims specify the physical location of the heater with respect to the resin container functionally. Claim 72 specifies that the molten resin composition is located so as to first contact the heated fibrous reinforcing material while that material is at a first temperature sufficiently above the resin composition temperature so that the resin composition fully or substantially fully wets out the material. Claim 78 recites that the heater is at a temperature and a location so that when the reinforcing material is brought in contact with the resin composition there results crystallization in the prepeg at the interface of reinforcing material and resin composition.

Anticipation requires the presence in the prior art reference of each and every element of the claimed invention, arranged as in the claim. The present claims impose a limitation on the arrangement of the heater and the resin composition that is absent in

the Nose reference. In the claimed invention, there is a necessary relationship between heater and resin composition that the Examiner must consider. The relationship of Claim 72 is necessarily absent in the Nose arrangement, as is evidenced by the failure of the Nose prepreg to be substantially fully wet out when the Nose apparatus is used.

This absence is confirmed by Fig. 6, which depicts the heater (13) for the fiber being located relatively remotely from the inlet (17) to the impregnating chamber (18). The temperature of heated glass, for example, might drop 400°F. in an inch in ambient conditions. Further, the guide at (16) the fiber contacts, which is going to be a heat sink and cool the fiber further. The Nose reference apparatus will not introduce the fiber to the melt at the same temperature to which it is heated at the heater. The Nose patent is only concerned with using the heater to “eliminate volatile substances . . . harmful to the shaping procedure.” Page 7, lines 9-10. The Nose reference does not teach, disclose, or suggest a location of the heater so that the fiber temperature when contacting the resin will cause the resin composition to fully or substantially fully wet out the fiber. Instead, the arrangement is such that the fibers are not more than 70% separated, and the degree to which those that are separated are wet out could be still lower.

Thus, the Nose reference positively excludes the heater/resin relationship of the present claims.

With regard to claim 78, the Nose reference does not teach or mention a crystallizable resin. Further, the Nose reference does not teach or mention a relationship of heater temperature and location to resin composition that will produce crystallization in a prepreg prepared with the apparatus. As the present specification

teaches, the crystallization results only if the heater is at a temperature and location to deliver the reinforcing material at a high enough temperature when it contacts the resin composition.

Further with regard to claim 80, the Nose application does not appear to mention maleic anhydride copolymers.

Accordingly, Applicant requests withdrawal of the rejection and reconsideration of the claims.

Rejection Under 35 U.S.C. § 103(a)

Claims 62-71, 73, and 75-77 have been rejected as unpatentable over the Nose reference, EP 0 393 536 A2. Applicant respectfully traverses the rejection and requests reconsideration of the claims.

The Nose reference teaches away from modifying its apparatus to obtain an apparatus in which the fibers are completely or substantially completely wet out because the Nose reference teaches that its fibers are no more than 70% separated from one another. (The degree to which the fibers are wet out could presumably be much lower—it certainly cannot exceed 70%.) It is settled law that teaching away is the antithesis of obviousness.

Claim 62 and its dependent claims explicitly require that the heater is so located as to provide the reinforcing material at a temperature at which its will be fully or substantially fully wet out by the molten resin. This relationship is excluded in the Nose

apparatus by that reference's requirement that at least 30% of the fibers are not wet out at all.

Further with regard to claims 63-67, the Nose reference does not disclose an apparatus including shear pins in the container of a molten resin composition.

Claims 73 and 75-77 are patentable over the Nose reference for the reasons discussed with respect to claim 72. Further with regard to claim 73, the Nose reference does not disclose an apparatus including at least one pair of compaction rollers.

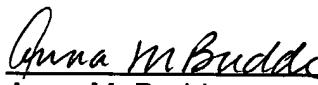
For these reasons, Applicant submits that the present invention is patentable over the Nose reference. According, Applicant requests reconsideration and allowance of the claims.

Conclusion

Accordingly, reconsideration and allowance of the claims are respectfully requested. Applicants believe that the claims are in condition for allowance, and an early allowance of the application is earnestly requested.

The Examiner is invited to telephone if it would be helpful to resolving any matter

Respectfully submitted,



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